Application Forms and General Information for the

Energy Revolving Fund

for the Design, Equipment and Installation
Related to Implementation of an

Energy Efficiency or Renewable Energy Project

Offered by the
Missouri Department of Natural Resources
Energy Center

PUB001223

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ENERGY REVOLVING FUND
Application Form and General Information

Table of Contents

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Energy Revolving Fund
Quick Start Guidelines

Eligible Parties: Missouri public schools, universities, colleges, cities, counties and publicly owned hospitals and water treatment plants are eligible.

Project Eligibility: Virtually any retrofit project that reduces energy costs is eligible. These are known as energy-conservation measures. Loans from the Energy Revolving Fund may be used to finance energy project costs for design, material acquisition, installation and commissioning. For new construction, loans from the Energy Revolving Fund may be used to finance the incremental costs of implementing energy-conservation measures that exceed the energy-efficiency standards established by ASHRAE standard 90.1 (latest edition). The applicant must own and operate the building or system associated with the proposed project.

Loan Amount: The minimum loan amount for a project is $5,000. The maximum loan amount for a project will depend on the availability of funds at the time of application. All loan awards are based on estimated energy savings that the energy-conservation measures will generate. These savings must be documented by the Energy-Conservation Measures Report submitted with the application.

Loan Terms and Rates: Loan terms and interest rates may vary. To determine current terms and rates, you may contact one of our loan managers or visit our web site at http://www.dnr.mo.gov/energy/financial/loan.htm. A loan origination fee of one percent will be included in the loan amount.

How to Apply: We strongly recommend that applicants contact an Energy Center loan manager prior to completing an application. Our staff will be more than happy to guide you through the application process. To apply for a loan, an Application form, Fuel Use Summary form and Energy-Conservation Measures Report must be submitted to the Energy Center for review. For straightforward projects, worksheets are provided in the appendix of this application packet that may be used as documentation for the Energy-Conservation Measures Report. These forms are also available in electronic PDF fill-in format on the department's Web site. For more complex projects, a professional energy consultant may be needed to complete the Energy-Conservation Measures Report.

When to Apply: Applications may be taken at any time during an open cycle. We may find it necessary at times to use a competitive cycle with specific application due dates. To determine the status of the current cycle, you may contact one of our loan managers or visit the Program Status section of our web site at http://www.dnr.mo.gov/energy/financial/loan.htm.

Where to Send Applications: Please mail the original completed application form and associated documents to the address below:

Missouri Department of Natural Resources
Energy Center
Attn.: Energy Loan Program Clerk
P.O. Box 176
1101 Riverside Drive
Jefferson City, MO 65102

For More Information: Energy Center staff members are available to discuss potential projects, offer energy-efficiency expertise and answer questions. For more information about our loan program, please contact the nearest Energy Center office listed below and ask to speak to a loan manager about energy-efficiency loans:

Jefferson City:	(573) 751-3443 or (800) 361-4827
Kansas City:	(816) 759-7313, ext. 2263
St. Louis:	(314) 340-5930

Web Site: http://www.dnr.mo.gov/energy/financial/loan.htm

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

APPLICATION

1. SECTOR

☐ School K-12 ☐ Local Government ☐ Higher Education ☐ Other _____

2. HOW DID YOU FIND US? (CHECK ALL THAT APPLY)

☐ Web Site ☐ Meeting/Event ☐ Direct Mail ☐ Colleague ☐ Other _____

3. ORGANIZATION NAME			
4. MAILING ADDRESS	5. CITY	6. ZIP CODE	7. COUNTY
8. CONTACT NAME	9. TITLE	10. PHONE NUMBER	11. FAX NUMBER
12. E-MAIL ADDRESS	13. TOTAL PROPOSED PROJECT COST	14. TOTAL LOAN AMOUNT REQUESTED	
15. PROJECT TYPE ☐ Building ☐ System _____	16. ESTIMATED START DATE	17. ESTIMATED PROJECT COMPLETION DATE	
18. PROJECT LOCATION (ATTACH LIST OR MAP FOR MULTIPLE LOCATIONS)		19. ESTIMATED ANNUAL ENERGY COST SAVINGS	

BUILDING SPECIFIC INFORMATION; FOR MULTIPLE BUILDINGS, USE SEPARATE SHEET OF PAPER

20. TOTAL BUILDING AREA IN SQUARE FEET	21. TOTAL AFFECTED BUILDING AREA IN SQUARE FEET	22. APPROXIMATE NO. OF BUILDING OCCUPANTS

FOR ORIGINAL BUILDING ►	23. YEAR OF CONSTRUCTION	24. HEATED AREA IN SQUARE FEET	25. COOLED AREA IN SQUARE FEET
FOR ADDITION #1 ►	26. YEAR OF CONSTRUCTION	27. HEATED AREA IN SQUARE FEET	28. COOLED AREA IN SQUARE FEET
FOR ADDITION #2 ►	29. YEAR OF CONSTRUCTION	30. HEATED AREA IN SQUARE FEET	31. COOLED AREA IN SQUARE FEET
FOR ADDITION #3 ►	32. YEAR OF CONSTRUCTION	33. HEATED AREA IN SQUARE FEET	34. COOLED AREA IN SQUARE FEET

35. NAME, COMPANY AND PHONE NUMBER OF ENERGY ANALYST OR OTHER WHO PREPARED ENERGY-CONSERVATION MEASURES REPORT

36. BUSINESS TYPE NAMED IN 35 ABOVE

☐ Applicant ☐ Engineering ☐ ESCO ☐ Other _____

APPROPRIATE DISTRICT NUMBERS BASED ON THE APPLICANT'S LOCATION	37. U.S. CONGRESSIONAL DISTRICT	38. MO SENATORIAL DISTRICT	39. MO LEGISLATIVE DISTRICT

The governing board or body has reviewed the Energy-Conservation Measures Report and agrees that the building or system information is correct and the project and associated energy-conservation measures have been correctly described. The governing board or body authorizes the contact person, named above, to provide any additional information relevant to the review and/or approval of this application.

The building, facility or system is owned and operated by the applicant. ☐ Yes ☐ No

PRINT NAME AND TITLE OF AUTHORIZED OFFICIAL	SIGNATURE OF AUTHORIZED OFFICIAL	DATE

APPLICATION INSTRUCTIONS

We strongly recommend that loan applicants contact an Energy Center loan manager before completing an application. Loan managers can be reached at any of the center's three locations:

Jefferson City: (573) 751-3443 or (800) 361-4827
Kansas City: (816) 759-7313, ext. 2263
St. Louis: (314) 340-5930

Below are the instructions for selected loan application fields that may require clarification.

3-7. Enter the information for the organization's administrative office location.

8-12. Enter the contact person's information. The contact person is the individual who can answer the majority of the questions related to this application.

13. Enter the total project cost for all energy-conservation measures. This can include reasonable fees for design and commissioning.

15. Select the project type. If selecting "System," give a short description, such as motors or traffic signals.

16-17. Enter the planned start and completion dates of construction activities.

18. Some projects may include several building and/or system locations. Enter the total number of buildings or locations that will be directly affected by the proposed project and the number of occupants for each building. If a list or map is needed, enter "see attached."

19. Enter the estimated annual energy cost savings calculated in the Energy-Conservation Measures Report.

20. Enter the total area of the building that is served by the utility meters in the Fuel Use Summary.

21. Enter the area of the building that will be affected by energy-conservation measures.

35. Enter the contact information for those who provided the technical documentation.

36. Select the business type of the energy analyst identified in 35. If selecting "Other," please describe.

37-39. Enter the appropriate district numbers based on the applicant's location.

Remember to have the authorized official sign and date the application. Understand that this is an application only, and it does not obligate an organization to take a loan, if approved by the Energy Center.

Mail the original completed application and associated documents to the address below:

Missouri Department of Natural Resources
Energy Center
Attn.: Energy Loan Program Clerk
P.O. Box 176
1101 Riverside Drive
Jefferson City, MO 65102

APPLICANT ORGANIZATION NAME	
SPECIFIC BUILDING OR SYSTEM NAME	
TOTAL AREA COOLED IN SQUARE FEET	TOTAL AREA HEATED IN SQUARE FEET

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

FUEL USE SUMMARY

MONTH	YEAR	UTILITY PROVIDING FUEL			UTILITY PROVIDING FUEL		UTILITY PROVIDING FUEL	
		ELECTRIC			NATURAL GAS		FUEL OIL/LPG/ OR OTHER _____	
		USAGE (kWh)	DEMAND (kW)	COST $	USAGE (_____)	COST $	USAGE (_____)	COST $
JANUARY								
FEBRUARY								
MARCH								
APRIL								
MAY								
JUNE								
JULY								
AUGUST								
SEPTEMBER								
OCTOBER								
NOVEMBER								
DECEMBER								
ANNUAL TOTAL								
AVERAGE UNIT COST								
ACCOUNT NUMBERS								

FUEL USE SUMMARY INSTRUCTIONS

*This form should be completed for **each** building or system that has an individual meter.*

Utility bill data is key to identifying energy usage patterns and potential savings, so it is essential that utility bill data is provided. Complete the **Fuel Use Summary** form by entering the fuel usage and cost data from the utility bills of the most recent 12-month period for each building or system proposed to receive loan funds. Record the year relevant to the month as appropriate in the "YEAR" column and identify the name of the utility for each relevant fuel type.

Electric Bills: The unit for electricity is kilowatts hours(kWh). Also enter the electric demand (kW) for each month.

Natural Gas: Natural gas units are generally expressed in therms or CCF (one hundred cubic feet). Indicate which unit is being expressed.

Other Fuel: Units of fuel oil and LPG are generally expressed in gallons. Other units may be tons as in coal, cords and in wood, etc. Indicate which unit is being expressed when applicable.

The "Annual Total" and "Average Unit Cost" rows should be computed and entered in the appropriate spaces provided. Enter all relevant billing account numbers.

Energy-Conservation Measures Report

Energy cost savings through energy-conservation measures are the foundation for the Energy Revolving Fund. Reduced energy costs resulting from energy-conservation measures provide the money to repay a revolving loan. Therefore, the maximum amount of money loaned for a given project depends primarily on the estimated annual energy cost savings the project is expected to produce. The core of the application is documentation that calculates the anticipated annual energy savings. This document is called the **Energy-Conservation Measures Report**. We **must** have technical information to substantiate the anticipated energy cost savings of the project.

The **Energy-Conservation Measures Report** must include a basic description of the proposed energy-conservation measure(s), the estimated cost of the energy-conservation measure(s) and sufficient technical documentation to substantiate the annual energy cost savings estimate of each energy-conservation measure.

For straightforward projects, the double-sided worksheets found in the appendix of this packet may be used as sufficient technical documentation to substantiate the annual energy cost savings as well as provide a narrative description of the energy-conservation measure(s). There is a worksheet for each of the following types of projects:

Wall or Ceiling Insulation
Pipe Insulation
Programmable Setback Thermostat
Lighting Fixture Upgrade/ Motion Sensors
Window Replacement/Window Reduction
Heating Plant Replacement
Cooling Plant Replacement

Projects that are more complex must be handled on a case-by-case basis. Detailed calculations and/or computer modeling may be required. Again, contacting a loan manager for guidance for specific projects is strongly recommended.

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Appendix A

Common Energy-Conservation Measures

This list includes common energy-conservation measures funded by the Energy Revolving Fund. This list does not cover all projects and does not provide details that may be important. Contact an energy loan manager to help maximize a project's potential loan value.

Lighting upgrades are usually very cost effective. The savings generated usually will be sufficient to pay for the lighting energy-conservation measure(s) and may carry over to help pay for another energy-conservation measure that has a longer payback.

Cooling plant projects to upgrade existing equipment or new installations in buildings that do not presently have cooling.

Heating plant projects often have very good payback due to poor efficiency ratings on older equipment. Replacement of steam boilers with staged hot-water boilers and appropriate controls are often very cost effective.

Ground and air source heat pumps often provide energy savings sufficient to pay for a large portion of the system cost for retrofits. For new construction, we can often loan more than the incremental cost for ground source, and the additional loan funds can offset costs of other high-efficiency energy-related components of the new building.

Window replacement: Due to the cost of these projects, energy savings generally will support only a portion of the project cost, and paybacks tend to be long, so it is good to combine these projects with others such as lighting upgrades to achieve a reasonable payback period for the overall project. Also, historic preservation issues are sometimes relevant for these kind of projects. We can provide contacts for technical assistance on historic preservation issues through the department's State Historic Preservation Office.

Window reduction projects have a much better payback period than window replacement projects. It is important to have a good understanding of how reducing the window area will impact occupants of the building. For areas with no negative impact on the occupants, this can be a very cost-effective energy-conservation measure.

*It is important to understand that the contribution by individual energy-conservation measures to energy cost savings can be complicated by what is known as "**interaction**." For example, if it is estimated that a window replacement will save 10 percent on heating costs, and a boiler replacement will save 20 percent on heating costs, the actual estimated savings for doing both replacements will be something less than the sum of the two individual estimates, or less than 30 percent. This is interaction. Contact a loan manager for more information about interaction.*

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Appendix B

Energy Unit Conversion Table

The table below may be useful for completing the worksheets found in this packet. This table assists with converting various units of energy to million Btu (MMBtu). To use the table, find the relevant fuel type, determine the cost per unit of that fuel and multiply by the appropriate conversion number to obtain the cost per MMBtu.

Fuel Type	Abbreviation	Multiply	By	To Obtain
Electricity	E	$/Kwh	293	$/MMBtu
Natural Gas	NG	$/Therm	10.0	$/MMBtu
Natural Gas	NG	$/CCF	10.0	$/MMBtu
Propane	LPG	$/Gallon	10.9	$/MMBtu
Oil	Oil	$/Gallon	7.2	$/MMBtu
Coal	Coal	$/Ton	0.045	$/MMBtu
Wood	Wood	$/Cord	0.045	$/MMBtu

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Appendix C

Energy-Conservation Measures Worksheets

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

WALL OR CEILING INSULATION WORKSHEET

BUILDING	LOCATION	DATE

CHECK THE TYPE OF INSULATION PROJECT UNDER CONSIDERATION

☐ Attic ☐ Crawl Space ☐ Wall ☐ Roof ☐ Other _____

To estimate the savings of adding insulation to the ceiling or wall, the following information must be known:

The area to be insulated in square feet.
The old R-value.
The new total R-value.
The heating plant efficiency (in percent). (Check nameplate or with contractor).
The heating energy cost ($/million Btu).

SAVINGS CALCULATIONS

1. Enter the old R-value . . . . . _____
2. Enter the new total R-value . . . . . _____
3. Subtract line 1 from line 2 . . . . . _____
4. Multiply line 1 by line 2 . . . . . _____
5. Divide line 3 by line 4 . . . . . _____
6. Enter the area to be insulated (square feet) . . . . . _____
7. Multiply line 5 by line 6 . . . . . _____
8. Enter the heating plant efficiency (percent divided by 100) . . . . . _____
9. Divide line 7 by line 8 . . . . . _____
10. Divide line 9 by 10.0 . . . . . _____
11. Enter the energy cost ($/million Btu) . . . . . _____

ANNUAL SAVINGS

12. Multiply line 10 by line 11 . . . . . $_____ /year

PROJECT COST

13. Enter the total cost to insulate the area including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

14. Divide line 13 by line 12 . . . . . _____ years

DESCRIPTION PAGE

Wall or Ceiling Insulation Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

PIPE INSULATION WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings of adding insulation to the outside of heat distribution pipes, the following information must be known:

- The interior pipe diameter.
- The total length (feet) of pipe to be insulated.
- The pipe fluid temperature (°F).
- The pipe room temperature (°F).
- The hours of use per day.
- Bare pipe heat loss factor (use Heat Loss Factor Table).
- Thickness of added insulation.
- Insulated pipe heat loss factor (use Heat Loss Factor Table).
- Heating plant efficiency (in percent).
- The energy cost ($/million Btu)

SAVINGS CALCULATIONS

1. Enter the bare pipe heat loss factor . . . . . _____
2. Enter the insulated pipe heat loss factor . . . . . _____
3. Subtract line 2 from line 1 . . . . . _____
4. Enter the pipe fluid temperature (°F) . . . . . _____
5. Enter the pipe room temperature (°F) . . . . . _____
6. Subtract line 5 from line 4 . . . . . _____
7. Enter the total length (feet) of pipe to be insulated . . . . . _____
8. Enter the hours of use per year . . . . . _____
9. Multiply line 3 by line 6 by line 7 by line 8 then divide by 1,000,000 . . . . . _____
10. Enter the heating plant efficiency (percent divided by 100) . . . . . _____
11. Divide line 9 by line 10 . . . . . _____
12. Enter the energy cost ($/million Btu) . . . . . _____

ANNUAL SAVINGS

13. Multiply line 11 by line 12 . . . . . $_____ /year

PROJECT COST

14. Enter the total cost to insulate the pipe including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

15. Divide line 14 by line 13 . . . . . _____ years

DESCRIPTION PAGE

Pipe Insulation Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

HEAT LOSS FACTOR TABLE

(REFERENCE FOR PIPE INSULATION WORKSHEET)

INTERIOR PIPE DIAMETER	BARE PIPE FACTOR	INSULATED PIPE FACTOR						
		INSULATION THICKNESS (INCHES)						
		1/2	3/4	1	1 1/4	1 1/2	1 3/4	2
1/2	0.63	0.163	0.135	0.116	0.105	0.098	0.091	0.086
3/4	0.76	0.191	0.155	0.135	0.120	0.110	0.103	0.096
1	0.93	0.211	0.179	0.153	0.136	0.125	0.115	0.108
1 1/4	1.14	0.263	0.210	0.178	0.158	0.143	0.132	0.122
1 1/2	1.27	0.287	0.232	0.194	0.172	0.154	0.142	0.132
2	1.53	0.345	0.271	0.229	0.198	0.178	0.163	0.151
2 1/4	1.87	0.425	0.325	0.270	0.237	0.210	0.190	0.175
3	2.15	0.487	0.368	0.309	0.251	0.214	0.211	0.195
4	2.65	0.600	0.447	0.375	0.305	0.279	0.252	0.231
5	3.20	0.663	0.500	0.407	0.346	0.305	0.271	0.245
6	3.70	0.852	0.628	0.536	0.432	0.379	0.341	0.305
8	4.75	1.090	0.828	0.650	0.549	0.486	0.433	0.388
10	5.75	1.341	0.990	0.778	0.678	0.580	0.511	0.457
12	6.75	1.550	1.152	0.920	0.802	0.664	0.604	0.541

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ENERGY CENTER – ENERGY REVOLVING FUND

PROGRAMMABLE SETBACK THERMOSTAT WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings possible from a temperature reduction or night setback, the following information must be known:

The existing weekly operating hours when occupied.
The existing weekly operating hours when unoccupied.
The proposed weekly operating hours when occupied.
The proposed weekly operating hours when unoccupied.
The annual heating cost.
The existing weekly operating temperature when occupied.
The existing weekly operating temperature when unoccupied.
The proposed weekly operating temperature when occupied.
The proposed weekly operating temperature when unoccupied.

SAVINGS ESTIMATE

1. Enter the existing weekly operating hours when occupied . . . . . _____
2. Enter the existing weekly operating temperature when occupied . . . . . _____
3. Multiply line 1 by line 2 . . . . . _____
4. Enter the existing weekly operating hours when unoccupied . . . . . _____
5. Enter the existing weekly operating temperature when unoccupied . . . . . _____
6. Multiply line 4 by line 5 . . . . . _____
7. Add line 3 to line 6 . . . . . _____
8. Enter the proposed weekly operating hours when occupied . . . . . _____
9. Enter the proposed weekly operating temperature when occupied . . . . . _____
10. Multiply line 8 by line 9 . . . . . _____
11. Enter the proposed weekly operating hours when unoccupied . . . . . _____
12. Enter the proposed weekly operating temperature when unoccupied . . . . . _____
13. Multiply line 11 by line 12 . . . . . _____
14. Add line 10 to line 13 . . . . . _____
15. Subtract line 14 from line 7 . . . . . _____
16. Multiply 0.0002 by line 15 . . . . . _____

If the heating energy source is not used for any other purposes and the cost for heating the building is known, then skip lines 17 through 20 and enter the value on line 21. If the energy source supplies heating as well as other needs of the building, go to line 17.

17. Total the seven energy bills that heating is included in from October through April and enter that amount . . . $ _____
18. Enter the amount of the May energy bill that includes heating . . . . . $ _____
19. Multiply 7.0 by line 18 . . . . . $ _____
20. Subtract line 19 from line 17 AND ENTER THIS VALUE ON LINE 21 BELOW.
21. ANNUAL HEATING COST . . . . . $ _____

ANNUAL SAVINGS

22. Multiply line 16 by line 21 . . . . . $ _____/year

PROJECT COST

23. Enter the total cost for the proposed project including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

24. Divide line 23 by line 22 . . . . . _____ years

DESCRIPTION PAGE

Programmable Setback Thermostate Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

LIGHTING FIXTURE UPGRADE/MOTION SENSOR WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings when more efficient lighting is installed, the following information must be known:

The number of old fixtures being changed.

The wattage of each old fixture.

The number of hours of use per year in the past.

The number of new fixtures being installed.

The wattage of each new fixture.

The number of hours of use per year in the future.

The cost per kilowatt hour of electricity.

SAVINGS CALCULATIONS

1. Enter the number of old fixtures being changed . . . . . _____
2. Enter the wattage of each old fixture . . . . . _____
3. Enter the hours of use per year in the past . . . . . _____
4. Enter the cost per kilowatt hour of electricity . . . . . _____
5. Multiply line 1 by line 2 by line 3 by line 4 and divide by 1000 . . . . . .(Present annual cost of lighting) . . . . . $ _____/year
6. Enter the number of new fixtures being installed . . . . . _____
7. Enter the wattage of each new fixture . . . . . _____
8. Enter the new hours of use per year in the future . . . . . _____
9. Enter the cost per kilowatt hour of electricity . . . . . _____
10. Multiply line 6 by line 7 by line 8 by line 9 and divide by 1000 . . . . . (Future annual cost of lighting) . . . . . $ _____/year

ANNUAL SAVINGS

11. Subtract line 10 from line 5 . . . . . $ _____/year

PROJECT COST

12. Enter the total cost to modify the lighting including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

13. Divide line 12 by line 11 . . . . . _____ years

DESCRIPTION PAGE

Lighting Fixture Upgrade/Motion Sensor Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

WINDOW REPLACEMENT/WINDOW REDUCTION WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings of replacing existing windows with efficiency upgrades, the following information must be known:

The R-Value of the new wall (window reduction only). U-Value=1/R-Value
The U-Value of the existing window (See U-Value table below).
The U-Value of the replacement window (See U-Value table below).
The total area of the windows being replaced (square feet).
The heating energy cost ($/million Btu).
The heating plant efficiency (in percent).

SAVINGS CALCULATIONS

		(a) Old Windows	(b) New Windows	(c) New Wall (window reduction)
1.	Enter the U-Values			
2.	Infiltration Factor	1.00	0.14	0.00
3.	Add line 1 to line 2			
4.	Enter area			
5.	Multiply line 3 by line 4			
6.	Multiply line 5 by .100 or [(degree days)*24/10^6]			
7.	Enter the heating plant efficiency (percent divided by 100)			
8.	Divide line 6 by line 7			
9.	Enter the energy cost ($/million BTU)			
10.	Multiply line 8 by line 9			

ANNUAL SAVINGS

11. Subtract line 10b and 10c from line 10a . . . . . $_____ year

PROJECT COST

12. Enter the total cost of the window replacement including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

13. Divide line 12 by line 11 . . . . . _____ years

WINDOW U-VALUE TABLE

Window System Type	U-Value*
Single Glass	1.10
Single Glass with storm window	0.50
Single Glass, low E coating	0.91
Single Glass, low E coating with storm window	0.44
Insulating Glass (double glass)	0.55
Insulating Glass (double glass), with storm window	0.35
Insulating Glass (double glass), low E coating	0.38
Insulating Glass (double glass), low E coating with storm window	0.32
Insulating Glass (triple glass)	0.35
Insulating Glass (triple glass), with storm window	0.25

*U-Values adapted from the 1985 ASHRAE Fundamentals Handbook.

DESCRIPTION PAGE

Window Replacement/Window Reduction Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

HEATING PLANT REPLACEMENT WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings possible from a heating plant replacement that is intended to increase the efficiency and/or change energy sources, the following information must be known:

The annual heating cost.
The efficiency of the existing heating plant (in percent).
The efficiency of the proposed heating plant (in percent).
The existing energy cost (cost per million Btu).
The proposed energy cost (cost per million Btu).

SAVINGS ESTIMATE

If the heating energy source is not used for any other purposes and the cost for heating the building is known, then skip lines 1 through 4 and enter that value on line 5. If the energy source supplies heating as well as other needs of the building, proceed with line 1.

1. Total the seven energy bills that heating is included in from October through April and enter that amount . . . $ _____
2. Enter the amount of the May energy bill that heating is included in . . . . . $ _____
3. Multiply 7.0 by line 2 . . . . . $ _____
4. Subtract line 3 from line 1 and enter this value on line 5 below.
5. ANNUAL HEATING COSTS . . . . . $ _____
6. Enter the efficiency of the existing heating plant (percent divided by 100) . . . . . _____
7. Multiply line 5 by line 6 . . . . . $ _____
8. Enter the efficiency of the proposed heating plant (percent divided by 100) . . . . . _____
9. Divide line 7 by line 8 . . . . . $ _____

If the proposed heating plant will use the same energy source as the existing one, skip lines 10 through 13 and enter the value from line 9 on line 14. If the energy sources for the proposed and existing plants are different, proceed with line 10.

10. Enter the existing energy cost ($/million Btu) . . . . . _____
11. Divide line 9 by line 10 . . . . . $ _____
12. Enter the proposed energy cost ($/million Btu) . . . . . _____
13. Multiply line 11 by line 12 and enter this value on line 14 below.
14. PROJECTED ANNUAL HEATING COSTS . . . . . $ _____

ANNUAL SAVINGS

15. Subtract line 14 from line 5 . . . . . $ _____/year

PROJECT COST

16. Enter the total cost for the proposed project including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

17. Divide line 16 by line 15 . . . . . _____ years

DESCRIPTION PAGE

Heating Plant Replacement Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER – ENERGY REVOLVING FUND

COOLING PLANT REPLACEMENT WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings possible from a cooling plant replacement that is intended to increase the efficiency and/or change energy sources, the following information must be known:

The annual cooling cost.
The efficiency of the existing cooling plant [SEER, EER, COP or (1/kw per ton)].
The efficiency of the proposed cooling plant [SEER, EER, COP or (1/kw per ton)]. (Use same rating as above.)
The existing energy cost (cost per million Btu).
The proposed energy cost (cost per million Btu).

SAVINGS ESTIMATE

If the cooling energy source is not used for any other purposes and the cost for cooling the building is known, then skip lines 1 through 4 and enter that value on line 5. If the energy source supplies cooling as well as other needs of the building, proceed with line 1.

1. Total the four energy bills that cooling is included in from June through September and enter that amount . . $ _____
2. Enter the amount of the May energy bill that cooling is included in . . . . . $ _____
3. Multiply 4.0 by line 2 . . . . . $ _____
4. Subtract line 3 from line 1 AND ENTER THIS VALUE ON LINE 5 BELOW.
5. ANNUAL COOLING COSTS . . . . . $ _____
6. Enter the SEER, EER, COP or (1/kw per ton) of the existing cooling plant . . . . . _____
7. Multiply line 5 by line 6 . . . . . $ _____
8. Enter the SEER, EER, COP or (1/kw per ton) of the proposed cooling plant (Use same rating as line 6.) . . . . . _____
9. Divide line 7 by line 8 . . . . . $ _____

If the proposed cooling plant will use the same energy source as the existing one, skip lines 10 through 13 and enter the value from line 9 on line 14. If the energy sources for the proposed and existing plants are different, proceed with line 10.

10. Enter the existing energy cost ($/million Btu) . . . . . _____
11. Divide line 9 by line 10 . . . . . $ _____
12. Enter the proposed energy cost ($/million Btu) . . . . . _____
13. Multiply line 11 by line 12 and ENTER THIS VALUE ON LINE 14 BELOW.
14. PROJECTED ANNUAL COOLING COSTS . . . . . $ _____

ANNUAL SAVINGS

15. Subtract line 14 from line 5 . . . . . $ _____/year

PROJECT COST

16. Enter the total cost for the proposed project including material, labor and design . . . . . $ _____

SIMPLE PAYBACK

17. Divide line 16 by line 15 . . . . . _____ years

DESCRIPTION PAGE

Cooling Plant Replacement Energy - Conservation Measure

Describe the existing system and the proposed energy-conservation measure (use additional sheets if necessary):